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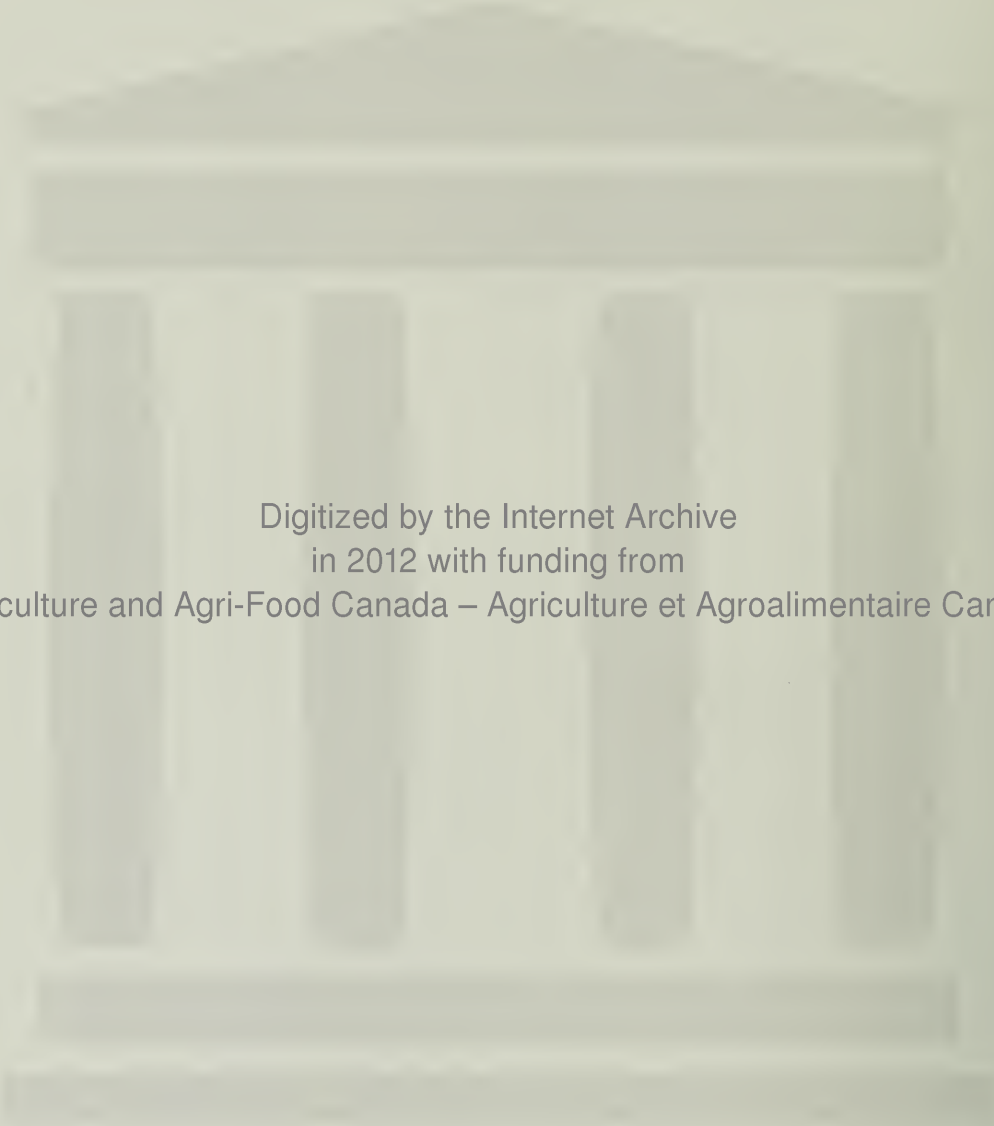


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growing TREES in Canadian gardens





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growing **TREES** in Canadian gardens

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La culture des arbres dans les jardins canadiens.

Front cover

left top: *Liriodendron tulipifera*; tuliptree

left center: *Acer rubrum*; red maple

left bottom: *Larix sibirica*; Siberian larch (spring foliage)

center: *Larix sibirica*; Siberian larch (fall foliage)

right: *Gleditsia triacanthos* 'Sunburst'; sunburst honey-locust

Back cover

left: *Malus xadstringens*; hybrid crab apple

right top: *Chionanthus retusus*; fringe tree

right bottom: *Picea pungens*; Colorado spruce

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INTRODUCTION

This publication is intended to assist the homeowner in the selection, planting, and care of ornamental trees around the home. The trees may be deciduous, which lose their leaves each year, or evergreens. Normally, however, they are varieties and forms specially developed for home landscaping, rather than trees suitable for forestry cultivation.

In the past few decades, extensive plant breeding and selection have been carried out to develop new, smaller forms of trees in keeping with modern architecture. In addition, more and larger garden centers and nurseries provide a wide selection of trees and shrubs, and if you search a little you are bound to find plants that suit your requirements.

THE USES OF TREES FOR HOME GROUNDS

Depending on their size and location, trees can be used for many purposes in the garden or around farm grounds. On large properties or those set well back from the road, a driveway or walkway bordered by trees adds distinction; but they should be set back far enough so that at maturity their branches will not impede traffic. Also, a view framed by trees creates a charming effect. In both cases the same type of tree should be used throughout for uniformity.

Trees planted close to the street should be tolerant of pollution and, in some areas of the country, tolerant of salt as well. Such trees as sugar maple and silver birch, which have been widely used in the past, are now proving to be sensitive to such stress. Satisfactory replacements are difficult to find as more and more species prove susceptible to stress, but at present the many forms of littleleaf linden, in a variety of shapes, and the maidenhair tree are proving to be quite suitable.

Choose the site carefully, because most trees live a long time and you are unlikely to move them. Do not plant trees with thorns or low-spreading branches close to sidewalks or pathways, where they can cause injury. Similarly, do not plant tall columnar trees under hydro or telephone cables. In such a situation a lower, spreading tree may be more appropriate.

Some trees such as ash and Manitoba maple are brittle and tend to shed branches during ice storms or high winds. If they must be planted, take care that falling branches cannot damage property.

Windbreaks

Homeowners are starting to realize that trees are effective windbreaks, a fact that farmers have known for years. A belt of trees and shrubs planted to break the force of winter gales can make a measurable difference to your heating bill. Evergreen trees, which retain their foliage year round, make a better windbreak, but even deciduous trees produce an appreciable effect.

On farms, fast-growing poplars are common. Because they are short-lived, other slower growing species should be planted at the same time to provide continuity when the poplars die. In towns and cities poplars should be used with great caution. Their roots are wide-spreading and invasive, and they will quickly plug septic tanks and sewers.

Remember that a windbreak causes an eddy current in the wind, and therefore snow will be deposited in greater amounts on the leeward side. A windbreak is of doubtful value if it gives you twice the amount of snow to shovel.

Shade

The correct positioning of trees on the south and west sides of your house can do much to make it more comfortable year round. In summer, a tree will block much of the sun, preventing the house from overheating and providing cooling breezes. In winter, a deciduous tree will allow the sun to shine through and provide natural heating. A tree can thus save energy on both air-conditioning and heating.

If the location of a tree is chosen carefully, the tree can provide shade in a desired spot at a specific time. For example, it could shade a sandbox in the morning or a patio at dinnertime. With careful garden planning it may even do both!

Screening or highlighting

Planted in the right location, trees can be used to help screen out unwanted views or accent those that are desirable. Although a single tree cannot block out a large apartment building, it can help to detract from its size by providing another focal point. Trees with good floral displays, colored foliage, or bright fruit are best for this purpose.

When trees are used to frame a view or to provide an arch of branches over a garden feature such as a statue or a fountain, only those with plain foliage and inconspicuous flowers or fruit should be used so that they will not detract from the main point of interest.

Specimen trees

Twenty-five or thirty years ago, no landscaped property was complete without a pair of trees to frame the house. Modern ideas of landscape design have moved away from this concept. The present trend is to use one or two specimen trees that complement the architecture of the house. A long ranch-style bungalow and a two-story frame house do not require the same style and shape of tree.

Trees chosen as specimens usually have some distinctive characteristic that makes them unique. It may be form, as in the pendulous nootka cypress

or the pyramidal English oak; foliage color, such as the crimson king maple or the sunburst honey-locust; flowers and fruits, as in crab apples and hawthorns; or even fall color or winter bark.

No matter what the reason for your choice, specimen trees should be planted on their own, away from surrounding plants, so that their beauty can be fully appreciated. Allow at least 6 m between trees, except for dwarf or slender species.

SELECTING TREES

With the wide choice of plant material available, there is a tree to suit almost every location and climate. Naturally, in colder parts of the country the selection is more limited, and what may be a good choice for Alberta is not necessarily so for coastal British Columbia.

Hardiness

No matter how beautiful a tree may be, if it cannot survive in your area it is of no use to you. To determine your hardiness zone, consult the plant hardiness map on pages 36 and 37. Canadian nurseries use this map as the basis for setting hardiness-zone ratings, which they provide for all the woody plants they sell. Be careful when you order plants from the United States. The map of plant hardiness published by the United States Department of Agriculture does not coincide with the one published by Agriculture Canada.

The map is intended only as a guide. Because of microclimates, your own garden may be a full zone warmer or cooler than the rating indicated. However, if you choose trees recommended for your hardiness zone, you should be quite safe. Zone 1 is the coldest and zone 9 the warmest; consequently, if you live in zone 4b you can grow any plants that are rated from 1 to 4b but not those from zones 5 to 9.

Height

Most catalogs state the height of the plant at time of sale, not its eventual height. For the average tree, the spread will be about half the eventual height. This is only an approximation, and the ratio between height and spread will vary greatly from species to species and even from cultivar to cultivar. Agriculture Canada Publication 1343, *A checklist of ornamental trees for Canada*, gives the hardiness rating and height for all trees commonly available from nurseries.

Foliage

To most people a leaf is green. However, many trees have been developed that have foliage other than plain green. Probably the best known of these is the crimson king maple, whose leaves are a dark copper purple throughout the season. Other trees with red, yellow, or variegated leaves are available.

Another important factor is the density of the shade cast by a tree. Maples, for instance, provide heavy shade, making it difficult to grow grass beneath them but ideal for keeping a house cool during summer. Trees with compound leaves and small leaflets, such as yellowwood or honey-locust, cast only a light shade, and so lawns can still thrive.

A few trees, such as shingle oak, retain their leaves all winter and shed them only in the spring, when the new foliage unfurls. The leaves turn brown in the usual way in the fall but remain on the tree, where they provide interest during the winter months. The chief drawback of these trees is that their leaves have to be raked up in the spring, an additional chore.

Flowers

Although nearly every species of tree produces flowers of some kind, the flowers of some trees are very small and inconspicuous. A flowering tree is one with showy blossoms, grown mainly for its floral display. Because the purpose of flowers is to produce seeds to continue the species, most trees bloom early in the season; a few bloom during the summer; and one or two flower as winter approaches, usually shedding their seed the following year. Thus, when you select a flowering tree consider the period of bloom, among other factors.

In many parts of Canada, the flowering of some trees often coincides with the first really warm weather, which results in the flowers being very short-lived, sometimes surviving for only a day or two. Trees that normally flower earlier or later and that would fulfill the same landscape role are preferable.

Some species have cultivars with either single or double flowers. Double flowers are usually showier but often do not develop into fruit. This may or may not be a desirable trait. Similarly, some cultivars of crab apple produce an abundance of flowers one year and few or no flowers the next. With the many crab apple cultivars available, there is no reason to plant forms that bloom in alternate years.

Fruit

Trees that flower usually produce fruit as well. There are a few sterile forms raised not to produce seed, such as Marshall's seedless ash, for locations where seed production is a nuisance. Species with separate male and female trees, such as the maidenhair tree, obviously do not produce fruit

on the male trees. As mentioned above, trees with double flowers often produce few fruits or none.

Some trees produce fruit that is edible by either humans or birds (or both). When the fruit remains on the tree well into winter, it encourages birds to come into the garden.

Some trees have persistent fruit that is not edible. The attractiveness of the fruit during the winter months must be weighed against the cleaning up that has to take place in the spring, when the fruit is shed.

Effect in winter

In most of Canada winters are long. Trees that are attractive during this dormant period have much to recommend them. Evergreens, which stand out well against a snowy background, are a first choice, but many deciduous trees are also beautiful. Look for trees with attractive bark. It may be colored, striped, or peeling. Birches are a good example, but others are also available.

The habit of the tree is also of particular importance once the leaves are off. Weeping trees or those with a spreading outline are especially pleasing. Trees with many thin branches lose their character in the mass of detail.

Consider the background to the tree. If it will be seen in silhouette against a field or the sky, then its shape is important, especially in the winter. If detail will be lost against a hedge or other plants, then this characteristic can be ignored.

Buying trees

Most nurseries in Canada are operated by competent staff. However, as with everything else, you get what you pay for. If you order six flowering trees for \$10, you cannot expect regular-size nursery trees.

Most reputable nurseries move their trees every few years to develop a good fibrous root system close to the trunk. Trees that grow naturally tend to put down a few long roots at first, to ensure good anchorage, and then develop the fibrous roots at the ends. Trees transplanted from the wild have a lower survival rate, because the long anchor roots are broken during digging.

Many people want an instant garden and are not willing to wait and enjoy it as it develops naturally. Rather than planting a young tree about 3 m high, they plant a larger one, 6 m or more. Although this gives an immediate effect, it has several drawbacks. Large trees cannot be moved with their roots exposed. They must be dug carefully and the root ball must be wrapped in burlap. The tree must then be loaded onto a truck and delivered. This operation requires both labor and expensive machinery, for which you pay. Also, a large tree does not become established as quickly as a smaller one. It may stand for 5 years before it eventually starts to grow at a normal rate. Small trees get over this check by the second season. In fact, it is not unusual for a small tree to catch up and overtake a larger one.

CARE ON ARRIVAL

Plants that have been shipped from outside your city should always be signed for “unexamined”. Then, if they have been damaged in transit, you have a claim against the carrier. Store any plant material in a cool, shady place, out of the direct rays of the sun.

Replacement

Unpack the trees as soon as possible and examine them for damage. Small broken branches are not important; they can be removed during the initial pruning. Any tree that is badly damaged or has lost its leader (terminal shoot) should be returned to the nursery for replacement, because without expert care it is unlikely to develop into a well-shaped tree. Any shortages in the shipment should also be reported immediately. No nursery is infallible and most are willing to correct a mistake if it is reported promptly.

Heeling in

Once trees have been unpacked, they must not be allowed to lie about with their roots exposed to drying winds or sun. If you have purchased only a few trees and plan to plant them all on the same day, rewrap them loosely in the packaging material. However, if you have a number of trees or cannot plant them at once, they should be heeled in, as described below.

In a preferably shady part of the garden, dig a trench large enough to take the roots without crowding. If the roots appear dry, dip them into water or spray them. Place the trees side by side in the trench, cover the roots with soil, and pack it down firmly. This is a temporary measure only, to keep the trees in good condition until planting time.

Evergreen trees are delivered with their roots in a ball of soil wrapped in burlap. The burlap should not be removed but should be heeled in completely. If the soil feels dry, dip the entire root ball into water for a few minutes.

Evergreen trees (either coniferous or broadleaf) or trees that have started to leaf out should have their foliage sprayed with cool water two or three times a day while they are heeled in but not when the sun is shining on them.

More and more nurseries are selling plants in containers—usually cans, plastic pots, or bushel baskets. Plants that are grown in this manner may be planted at almost any time; they do not need to be heeled in, but make sure that they do not dry out.

PLANTING

A tree that is poorly or carelessly planted may either die or take several years to become established.

Time of planting

Deciduous and evergreen trees may be planted in either spring or fall—any time the tree is dormant and the ground is not frozen. Deciduous plants may be moved in the spring, from the time the frost is out of the ground until the new foliage is partly unfurled. In the fall, they may be planted from the time the leaves start to turn color until the soil freezes. Softwood trees (such as poplars, willows, and birches) become better established if they are moved in the spring.

In the spring, evergreens may be planted about 1 month later than deciduous trees, as long as they receive plenty of water. In the fall, they should be moved earlier than deciduous trees. Evergreens need at least 6 weeks before freeze-up to form new roots.

Preparing the site

Carefully remove any sod from the site, turn the soil over, and remove large rocks. In new housing developments make sure you remove all construction debris. Pieces of wood left in the soil can cause problems later on as they rot.

Dig the hole large enough to take the root system without crowding or folding the roots. Allow about 15 cm of space on all sides of a plant with bare roots or a small root ball. For larger evergreen trees with a root ball over 1 m in diameter, allow about 30 cm all around. On heavy soils with a high clay content, dig up the base of the hole with a garden fork to ensure good drainage.

Soil and amendments

Retain all the topsoil and discard any poor subsoil. Mix the topsoil and any additional soil needed with about one-quarter by volume of peat moss, leaf mold, compost, or well-rotted manure. For clay soils add about one-quarter by volume of sharp sand to improve the drainage.

Bone meal, which is slow to break down and become available to the plant, can be added at 2 g/L but on most soils it is not essential. If the soil is poor, add a general fertilizer such as 6-9-6 (contains 6% nitrogen, 9% phosphate, and 6% potash) or 7-7-7 at 1 g/L to give the tree a good start. Avoid fertilizers that are high in nitrogen, that is, those whose first number is much higher than the other two. Sprinkle the bone meal and fertilizer (if used) over the heap of soil and peat before you mix them.

Planting

Most trees are sold with their roots bare. The roots are usually protected with plastic or kraft paper that contains some damp material such as excelsior to keep them moist. Carefully remove the wrapping and any packing material. Trim back any broken roots with sharp pruning shears. If you have heeled in the trees, gently pull them out of the trench one at a time for planting. Evergreen trees or any others that are delivered with a burlap wrapping should be planted with their root ball still wrapped.

Set the plants in the hole with the old soil mark on the stem about 3 cm below soil level. Drive in a stake or other support (see “Staking”, which follows) and start filling the hole. Work the soil down between the roots or under the curve of the root ball, packing it down from time to time to avoid air pockets.

With burlap-wrapped plants, when the hole is about two-thirds full, untie the burlap from the base of the stem and carefully spread it out in the hole. Finish filling the hole and tread the soil to pack it firmly, leaving a slight depression. Water thoroughly.

Plant container-grown trees and shrubs in a similar way. Those in papier-mâché pots should be planted with the pot intact. Make three or four cuts in the sides of the pot to allow the roots to grow out. Break off the rim of the pot when the hole is almost full. These pots decompose in a couple of years.

Plants in metal or plastic pots should be removed from them with as little disturbance as possible. If you make cuts in the sides and bottom of the pot with metal shears, you can plant the container halfway and then peel it away without disturbing the roots too much. If you are planting the tree in a lawn, do not replace the sod. Leave the depression at least for the first year, to aid watering. Allow the grass to grow back a little, but keep a clear space around the trunk to aid root aeration and eliminate any chance of damage by the lawn mower. Even nylon grass whips will damage the bark on young trees.

A mulch spread around the base of transplanted trees will help to retain moisture and prevent weeds from growing. Bark chips or cocoa husks, for example, are readily available and are in keeping with the appearance of a tree.

Staking

All trees should be supported at the time of planting. Without this support the newly formed feeder roots are in danger of being torn off as the tree sways in high winds, or the tree may grow at an angle (Fig. 1).

The best means of support is a 5 cm × 5 cm wooden stake, 2.5 m to 3 m long, the bottom third treated with a nontoxic preservative. Fasten the tree to the stake with a commercial tree tie or a length of heavy wire (such as a cut coat hanger) threaded through a piece of garden hose. Loop the covered wire around the tree, cross the ends, and twist them around the stake (Fig. 2).

Evergreen trees that have a root ball cannot be supported in this way without the stake damaging the roots. Instead, drive in two supports on opposite sides of the root ball and join them with a cross strut. Attach the evergreen to the cross strut as described previously.

Large deciduous trees, 3 m or more in height, or those moved with a root ball are best supported by three guy wires. Do not forget to cushion the wire where it encircles the tree.

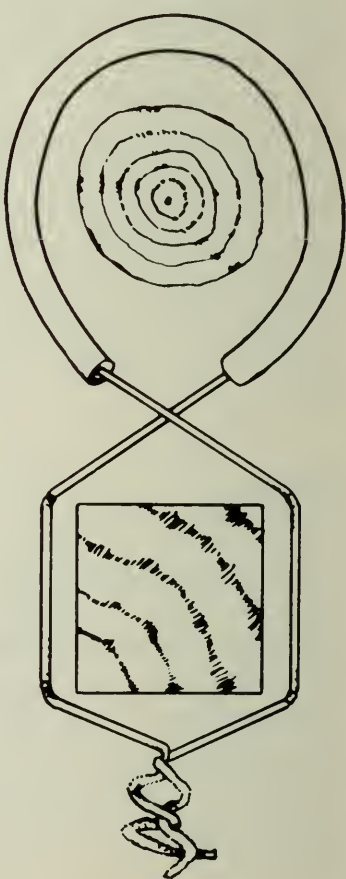
Watering

Newly planted trees should be kept uniformly moist for all of their first growing season. Thoroughly water the trees as soon as they are planted; fill the depression several times with water, allowing it to soak away after each filling. The use of a soluble plant-starter fertilizer will help to produce new roots. This type of fertilizer has a high phosphate content, which stimulates root growth (the middle number on the fertilizer label refers to the phosphate content, for example 5-15-5, 10-40-10). If you plant a tree in the fall, water it thoroughly at planting time; this is sufficient, and it ensures that the soil is washed into any small pockets of air that may have been left. In the following spring, water it as you would spring-planted trees.

FIG. 1 The trees would not be leaning if they had been staked when they were planted.



FIG. 2 Tree tied to a support.



Pruning

Bare-rooted deciduous trees should always be pruned at planting time. Pruning compensates for the roots lost during digging. Remove about one-quarter of the top growth but *do not cut out the main leader* (Fig. 3).

Small deciduous trees with a root ball wrapped in burlap do not need to be pruned heavily. Large specimen trees that are moved with a root ball should be pruned extensively. The older the tree at planting time the more important pruning becomes.

Evergreens planted in the spring can be lightly sheared if shearing will not spoil the shape of the tree; take care not to remove the leader. It is usually sufficient to spray with an antidesiccant, available at your local garden center. Fall-planted evergreens should always be sprayed with such a product. Do not clip fall-planted evergreens because clipping encourages new growth that would probably die during the winter.

Transplanting

If you make an error in your original planning and end up with a tree in the wrong place, it can be moved in the first 3 or 4 years without much

FIG. 3 How to prune a deciduous tree. Parallel lines show where to cut.



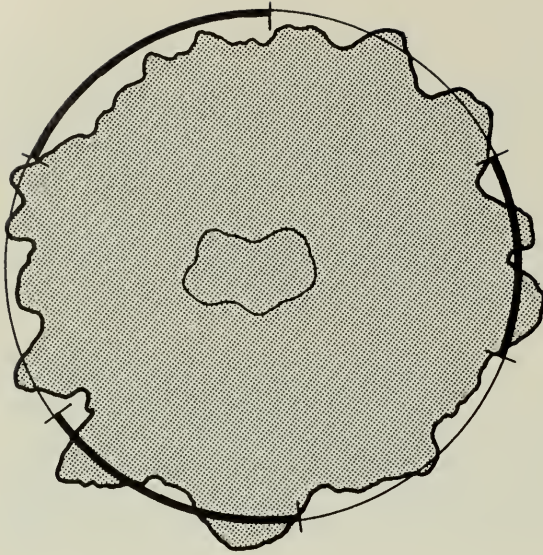


FIG. 4 Cut the roots in alternate sixths of the circumference (heavy lines) to prepare a tree for moving.

danger. If you purchase a bare-rooted tree, simply prepare the new hole, dig up the tree while it is dormant, and replant. It will of course be necessary to replace the stake. Trees with a root ball wrapped in burlap can be moved in a similar way, but more care is needed to prevent the root ball from breaking. Trees that have been in situ for several years are difficult to move. They should be prepared during the spring and moved the following spring or fall. Dig out a trench at the drip line (that is, the perimeter of the branches) in alternate sixths of the circumference (Fig. 4). The trench should be deeper for larger trees. Cut through all the roots and then refill with soil. During the summer the tree will be living on the uncut segments and will be creating new small roots in the filled-in portions. Thus, when you move the tree it will have new roots that will start to grow quickly.

CARING FOR ESTABLISHED TREES

After you have taken time and trouble to select the right tree, decided on the best location, dug the hole, and finally planted the tree correctly, do not waste all your work by neglecting the plant from then on. Check all tree ties twice during the growing season—once in mid-June, when the first flush of growth is over, and again in September, when the new wood is ripening. Loosen the ties if necessary, so that the tree does not become constricted. Do not expect newly planted trees to grow much in the first season. During this time they are busy making new roots, and there is little energy to spare for top growth. By the third season, usually, shoot growth should reach a normal rate.

Watering

Water during the first growing season whenever there is no natural rainfall. When you are watering, always allow enough water to soak the soil properly; do not water a small amount each day because this encourages shallow rooting, which makes the tree susceptible to future droughts and frost damage. Watering depends on the soil type—sandy loams need water every 7–10 days, clay soils much less frequently. Although in general, clay soils are much richer and grow better crops, they are not as easy to cultivate. It is very easy to overwater young trees planted in a soil mix (see “Soil and amendments”), because the surrounding clay dries out at a slower rate and does not allow the excess water to drain away.

Fertilizing

If bone meal or a general fertilizer is added to the soil at planting time or if a plant-starter fertilizer is used, no additional fertilizer is needed during the first year.

For the next few years, while the tree is relatively small, regular lawn fertilization provides enough nutrients for the young tree. If the tree is not growing in grass, fertilize it each spring with a general-purpose fertilizer (6-9-6 or 7-7-7) at 50 g/m².

Older trees usually require additional feeding; yellowing foliage, smaller leaves, and abnormal amounts of winter injury all indicate a possible nutritional deficiency. The feeding roots are situated approximately under the tips of the branches. Although their depth varies for each species, in general they are about 0.5 m below the surface. Thus, to be most effective, the fertilizer should be applied at the drip line of the tree and at the correct depth.

Using a crowbar, make a ring of holes around the drip line about 1 m apart and 0.5 m deep. Use a fertilizer with slightly more nitrogen, such as 10-8-6. The 10-6-4 formula for lawns is quite acceptable for trees.

Apply the fertilizer at 0.25–0.50 kg/cm of trunk diameter (measured at chest height) up to 15 cm diameter and double this (0.50–1.0 kg/cm) for trunks that are over 15 cm in diameter. Simply pour the fertilizer granules into the holes. This allows about 30–50 g of fertilizer per hole for small trees and 75–100 g for large ones. Fill the holes with a screened soil, sand, or peat moss, and water the area thoroughly to dissolve the fertilizer.

Large trees need two rings of holes about 1 m apart (Fig. 5) and very large trees with trunk diameters of 1 m or more need three or even four rings of holes.

Apply the fertilizer in the spring, when the trees are actively growing. Late application may stimulate growth so that the wood does not ripen properly, which may result in a large amount of winter injury.

Most mature trees growing on normal soils need feeding only every 3 or 4 years. It may be necessary to feed trees planted in poor or very sandy soils every year.

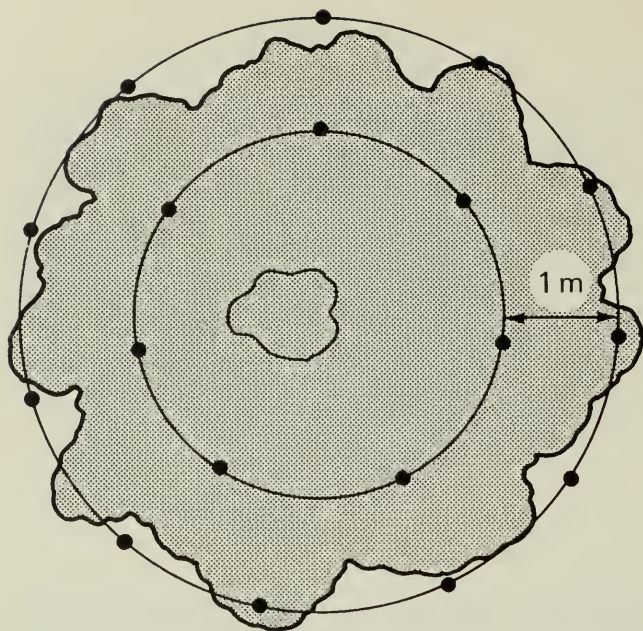


FIG. 5 For large trees make the first ring of holes at the drip line of the tree and the second ring of holes 1 m closer to the trunk.

Some fertilizer companies produce special tree spikes that contain a slow-release fertilizer. The spikes are pushed into the ground around the tree in a pattern similar to the one used for fertilizer granules. The tree spikes are an easy and efficient way to fertilize but are more expensive than granular feed.

Pest and disease control

There are many pests and diseases that can attack trees. Fortunately, very few of them are serious, because few precautions can be taken. The use of specific pesticides and fungicides is controlled by provincial departments of agriculture. Contact your provincial department for advice.

As a general rule, spray only when necessary. Unless you know that a perennial nuisance is present, e.g., birch leafminer, it is best to keep a close watch on your trees and spray only when a pest or disease becomes apparent.

Pruning

Most people are afraid to prune their trees. Although the trimming and pruning of large trees is best left to professionals, there is no reason why homeowners should not prune their own trees when the trees are young and easy to work with.

Pruning should not be done indiscriminately. Prune your trees for the following reasons only.

SHAPE: Prune your tree to maintain its natural shape (Fig. 6). This includes removing a branch that may be growing out of line and cutting water shoots—soft, vertical, rapidly growing shoots—that occur on crab apple trees in particular.

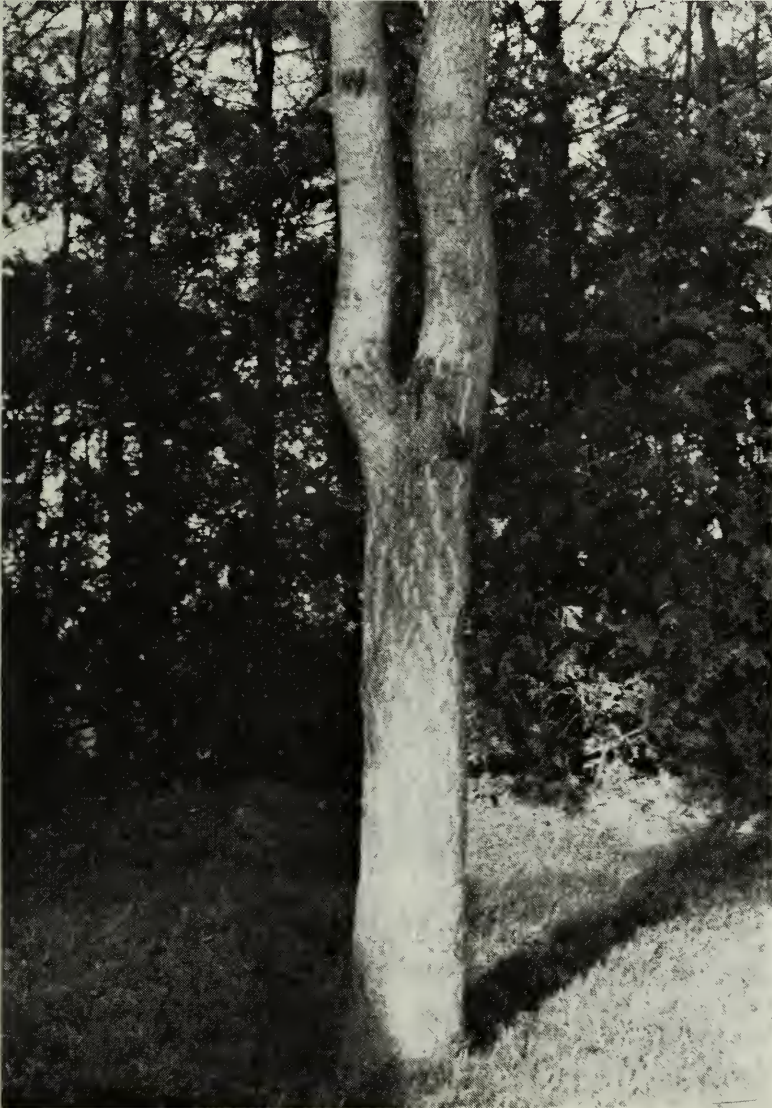
STRUCTURE: Structural pruning is done to maintain the framework of the tree. Remove weak branches and those that cross and rub (Fig. 7).

DISEASE CONTROL: Remove infected or badly wounded branches to prevent the spread of disease.

DAMAGE: Remove branches damaged by ice, storms, or mechanical means (Fig. 8).

FRUITING: Prune trees that are grown for their ornamental fruit, e.g., some cultivars of crab apple, to allow plenty of light into the center of the tree. This improves ripening and fruit production.

FIG. 6 The limb on the left should have been removed when it was small, to develop a straight trunk.





top left: Crimson king maple is appropriate when colored foliage is required.

top right: Harlequin maple also has colorful foliage.

bottom left: The tree on the left was nursery-size when it was planted, and the one on the right was more mature. Ten years later, they are almost the same size.

bottom right: The persistent fruit of the Siberian crab attracts birds.



top left: Rubylace honey-locust has finely cut leaves.

top right: Like many crab apple trees, the Siberian crab flowers well each summer.

bottom left: Pyramidal English oak is suitable in small areas.

bottom right: Sargent's cherry tree is showy, even without leaves.



FIG. 7 The branch that is rubbing against the tree on the left will cause problems unless it is removed.



FIG. 8 This branch was damaged by an automobile and should be removed.

Before you cut off any branch make sure its removal is necessary. If there is a choice of which branch to cut (as in the case of crossing branches) leave the one with the greater crotch angle. Branches with a narrow crotch angle are more easily broken (Fig. 9).

For most trees, pruning is best carried out in late winter (February or March), when the coldest weather has eased and before the sap starts to flow. Wounds start to heal with the resurgence of spring growth. Trees that have a copious, early sap flow, such as maples, are best pruned in autumn, as soon as the leaves have fallen. Damaged or diseased trees should be pruned as soon as the problem is noticed.

Various tools are necessary to prune properly (Fig. 10). Pruning shears, or secateurs, are used for cutting small branches up to about pencil thickness. Two types are available (Fig. 11): parrotbill, which have curved blades that cross like scissors, and anvil, which have one blade that cuts onto a flat platform.

Loppers are heavy-duty pruning shears mounted on long handles. They can cut wood that is up to 3 cm in diameter (depending on its hardness).

Pole pruners are similar to loppers but are mounted on a hardwood pole. One blade is fixed and the other is moved by a rope or wire. They are useful for trimming a tree lightly, without using a ladder.

A pruning saw is a thin backless saw that often has a coarse side for large branches and a fine side for trimming shrubs.

Polesaws are similar to pruning saws, but the blade is slightly curved and has the teeth pointing backwards, which cut on the pull stroke.

Most home gardeners need to buy only the pruning shears and saw. The others can be rented quite cheaply for a weekend. Good-quality tools are a worthwhile investment, and you should buy the best you can afford. Cheap pruners do not cut properly, soon lose their edge, and are rarely adjustable. A good pair will last a lifetime.

FIG. 9 The branch union on the left is the weaker.



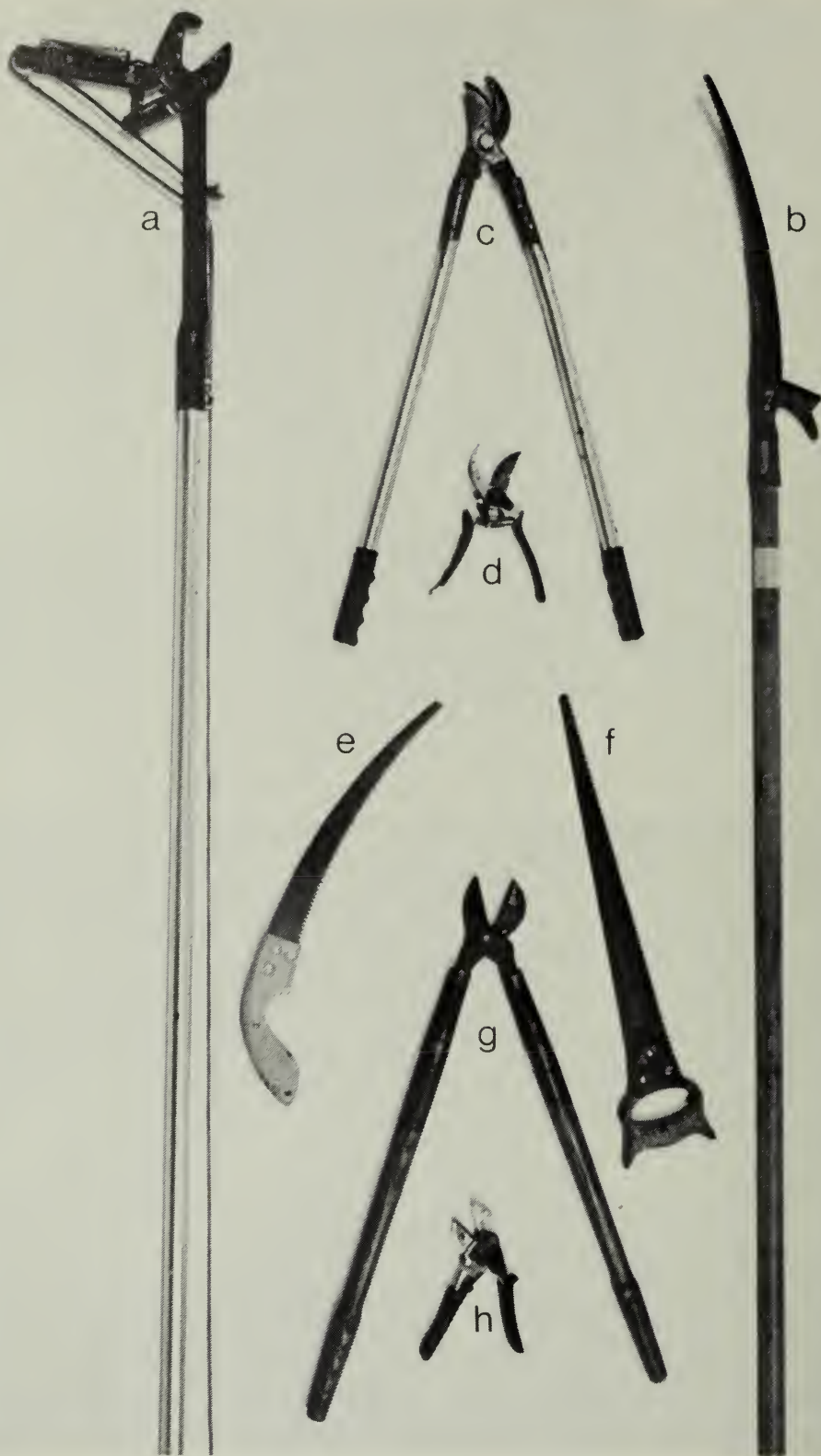


FIG. 10 Tools for pruning trees: (a) pole pruner; (b) pole saw; (c) parrotbill loppers; (d) parrotbill hand pruners; (e) curved pruning saw; (f) two-sided pruning saw; (g) anvil loppers; (h) anvil hand pruners.



FIG. 11 Hand shears (or secateurs) for light pruning.

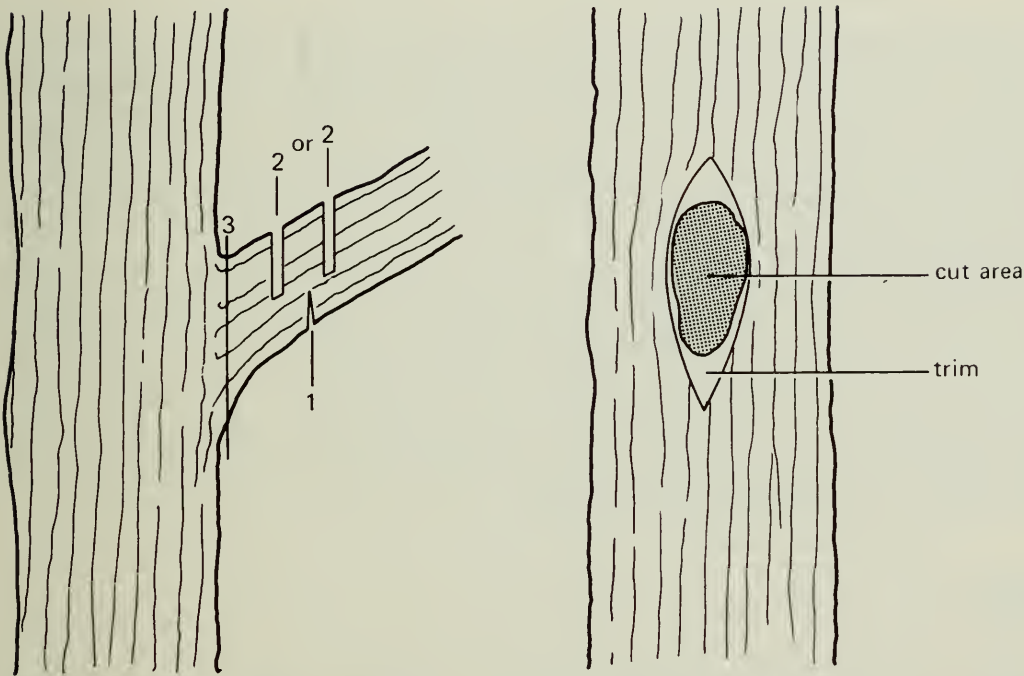


FIG. 12 How to remove the limb of a tree:

- step (1) undercut the branch one-quarter of the way through;
- step (2) cut from the top outside the first cut and the limb will drop to the ground or cut from the top inside the first cut and the limb will fall clear;
- step (3) cut the stump flush with the tree; trim the bark to a marquise (pointed oval) shape (*right*).



FIG. 13 Three stages in the natural healing of a wound.

Any tree limb that is large enough to require a saw should be removed as shown in Fig. 12: step (1) undercut the branch about one-quarter of the way through; step (2) cut from the top outside the first cut and the limb will drop to the ground or cut from the top inside the first cut and the limb will flip and fall clear, which can be useful if there is an obstruction below; step (3) cut the stump flush with the tree.

Once the stump is removed, trim around the edge of the cut with a sharp knife to remove any rough edges and torn bark. Trim the bark to a marquise (pointed oval) shape (Fig. 12) to achieve quick healing. Treat the wound with a commercial wound dressing available from your local garden center. These dressings are asphalt-based and contain a fungicide. They protect the wound from drying and from disease until new bark can grow over it (Fig. 13). All wounds over 2 cm should be so treated.

Repairs

Injury to the bark and failing to remove branch stubs (Fig. 14) when pruning are the two most common causes of rot in trees. Old trees that have been neglected and that have large cavities are best examined by professionals.

Small cavities, especially those toward the base of the tree, can be attended to by the homeowner (Fig. 15). Remove all rotted and discolored wood with a mallet and wood chisels. If this forms a pocket inside the tree, either enlarge the opening or drill a drain hole and insert a pipe (Fig. 16). After the cavity is thoroughly cleaned, it should be treated with a liberal application

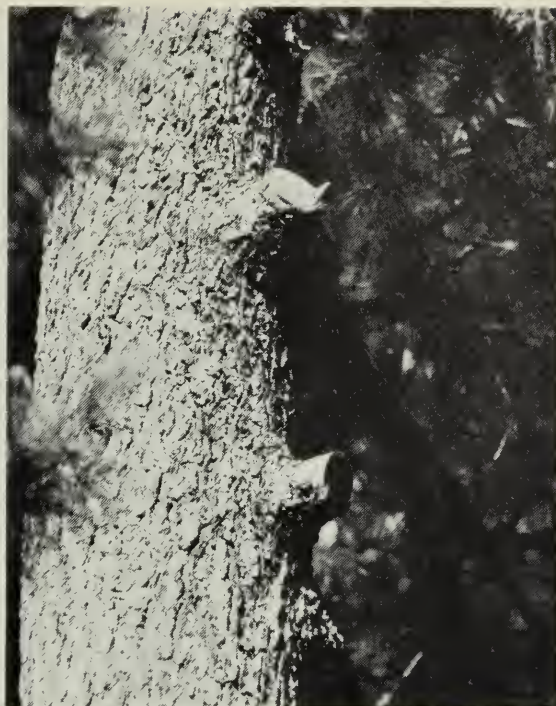


FIG. 14 Branch stubs should have been trimmed off flush with the trunk.

of a commercial tree-wound dressing. When this has dried, the cavity can be filled with a mixture of two parts sand to one part cement. Fill to the inner edge of the bark.

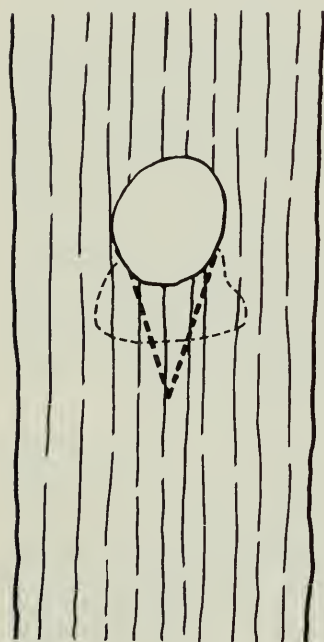
Cement mixes are not suitable for large cavities or for those that are high in the trunk, because the flexing of the tree in the wind will cause the cement to break. Any work that necessitates climbing onto the tree, such as filling cavities or installing braces or rods, is best left to professional tree surgeons. They have the equipment and the experience to carry out such work, as well as the insurance to protect themselves.

Young trees are sometimes damaged by rodents during the winter. Mice, in particular, will eat the soft bark at the base of the trunk. When the trees get older and the bark becomes corky, this is rarely a problem. If the bark is only eaten partway around, bevel the edges of the bark with a sharp knife and paint all the exposed wood with a tree-wound dressing.

If a circumference of bark is removed the tree is doomed, because the nutrients manufactured by the leaves cannot be transmitted to the roots. It is sometimes possible to save a tree by acting quickly and using a technique called bridge grafting. Cut pencil-thick pieces of twig, about 10 cm longer than the width of the wound, from the injured tree or from a similar species. Treat the wound with dressing, and then cut and lift flaps of bark above and below the injury. Make slanted cuts on the ends of the twigs and insert them underneath the flaps of bark (Fig. 17). Tack the twigs in place with a small nail and then seal them with wound dressing. Use one bridge for every 2 cm diameter of trunk at the point of injury. If the bridge grafting is successful, the tree will eventually grow over the bridges. For further details on bridge grafting, see Agriculture Canada Publication 1289, *Fruit tree propagation*.



FIG. 15 A basal cavity that should be filled in.



a



b

FIG. 16 Cavities must be drained before they are filled, either by (a) enlarging the opening or (b) installing a drain pipe.

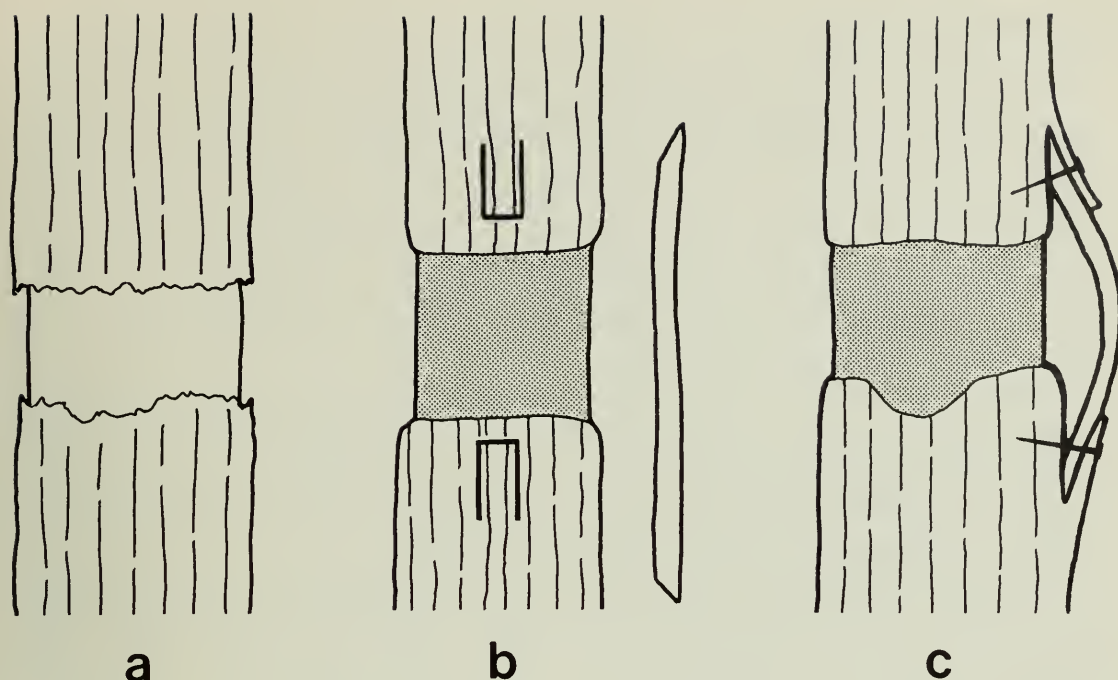


FIG. 17 A girdled tree can be saved by bridge grafting: (a) damage area; (b) damage treated with dressing, flaps cut, and bridge prepared; (c) bridge tacked into place.

Winter protection

To avoid bridge grafting, protect your trees so that rodents cannot eat the bark. A cage of hardware cloth (about 1-cm mesh) or one of the plastic tree wraps available commercially will give protection. The cage or wrap should project well above the expected snow line to stop such animals as snowshoe hares from eating the bark.

On deciduous trees, longitudinal cracks can form during periods of severe cold. They are caused in part by the sun warming one side of the tree and expanding the cells slightly. For this reason such cracks are usually found on the south or west side. Protect newly planted trees by wrapping the trunks in burlap up to the first branch. Longitudinal cracks also are more common when the tree is close to large buildings, where a shadow can move over it during the day, which causes a rapid drop in temperature. The following trees are particularly susceptible to this kind of injury: ash, beech, buckeye and chestnut, golden-rain, linden, maple (especially silver maple), plane tree, tuliptree, walnut, and willow. Take extra care when selecting a site for these species.

In general, evergreen trees seem immune to splitting, but because the needles remain on the tree year round, they continue to lose moisture in the winter. In years with below-normal rain in autumn, this can lead to desiccation of the needles over the winter, so that they are brown by spring. Although this is seldom fatal to the tree, it is unsightly. The best prevention is to water the plants well, just before freeze-up. Spraying with a commercial antidesiccant also helps, especially for young trees, which lack an extensive root system. The antidesiccant must be applied in early winter, after the last rain.

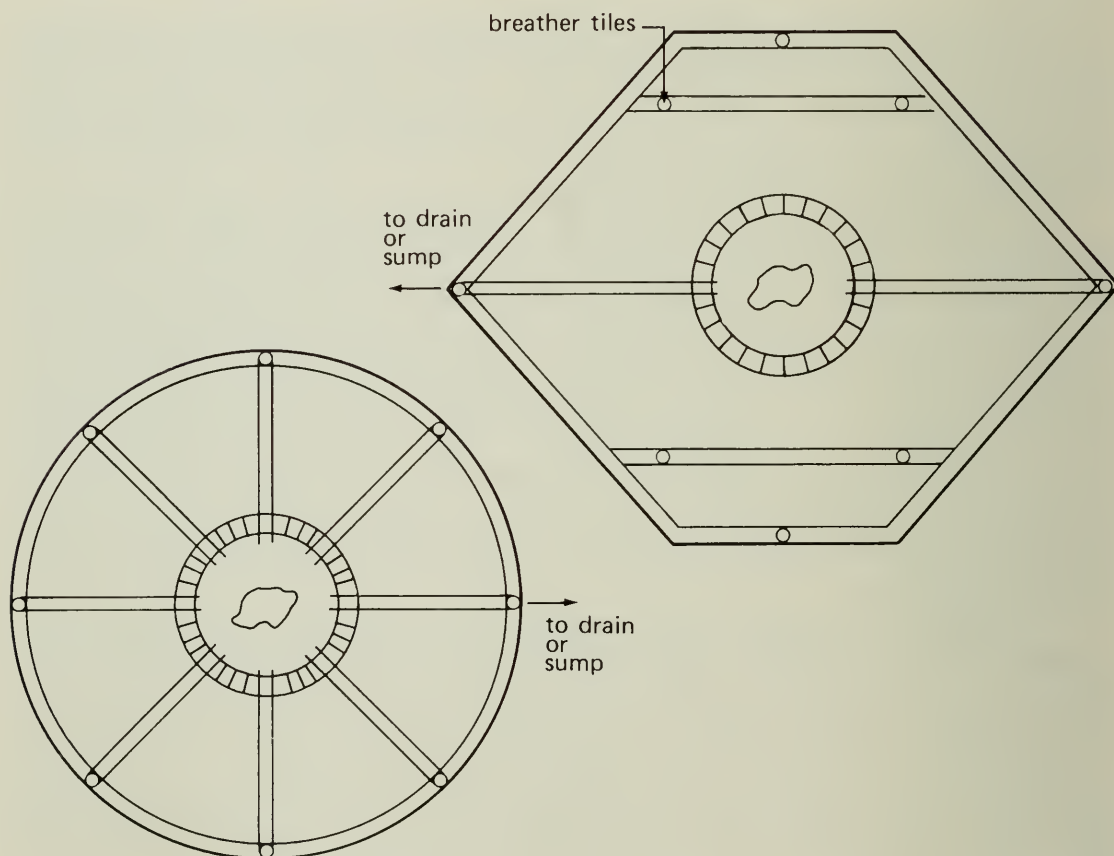
Changing the grade

When new houses are built on treed sites or when major garden renovations are carried out, it is sometimes necessary to change the soil level (grade). Obviously, if the level is lowered, the tree roots must not be left exposed, and so some form of retaining wall must be constructed. This should be at least at the drip line of the tree, and in cold areas even farther away from the trunk. A wall of this kind, whether dry stone, cement, or wood, allows the frost to penetrate from the side. This can lead to frost injury, even of species that are normally hardy.

Roots need to breathe, and the microorganisms in the soil that break down organic matter to release nutrients also require oxygen. Thus, anything that interferes with the supply of air to the root zone has a detrimental effect on the tree. Adding a layer of soil over the roots can either slowly suffocate a tree or weaken it so that it is subject to disease.

Some trees are more susceptible than others to injury from an extra layer of soil. Maple (especially sugar maple), beech, dogwood, most oaks, pine, and spruce are particularly sensitive; birch, cedar (arborvitae), and hemlock are less susceptible; and elm, poplar, willow, pin oak, and locust are seldom affected.

FIG. 18 Tile patterns that allow root aeration.



Both the depth of the fill and the type of soil are factors influencing susceptibility to injury. A thin layer of only a few centimetres of clay is enough to suffocate a tree, because of the fineness of the particles. Gravelly soils, however, are less of a problem, because both air and water can penetrate them.

If it becomes necessary to add fill over the roots of the tree, follow these procedures. Lay agricultural tiles on the existing grade in either of the patterns shown in Fig. 18. The tiles should slope away slightly from the trunk for drainage. Build a wall around the trunk of the tree, straddling the ends of the spokes (Fig. 19). Cover the joints in the tiles with heavy-duty plastic or pieces of shingle to prevent them from filling with soil (Fig. 20). Set upright tiles at the ends of the spokes to allow air to seep down or use piles of broken rock instead, if the change in grade is only about 50 cm. Then place a layer of broken rock (Fig. 21) and a layer of crushed stone over and around the tiles. Cover this in turn with enough gravel (Fig. 22) to prevent the soil from washing away. Add soil until you reach the desired new level (Fig. 23). At least 15 cm of soil is needed for growing grass or ground covers under the tree.

The wall should be about 50 cm away from the tree trunk for mature trees and farther for young trees, to allow for growth. It may be of dry stone, brick, or cemented stone. Lumber is not suitable because rot fungi may attack the tree. The wall should lean back at an angle of about 15 degrees, to counteract soil pressure. A dry-stone wall is preferable, because it allows air

FIG. 19 Retaining wall built and drainage tiles in position.





FIG. 20 Complete drainage-tile system with joints covered.



FIG. 21 A layer of broken rock is placed between the tiles.



FIG. 22 Gravel is then spread over crushed stone.



FIG. 23 Some soil has been added; the soil level will eventually be raised to the top of the retaining wall.

to circulate and has a certain amount of flexibility, and can thus withstand frost heave. If there is a danger of children climbing or falling into the well, it can be filled with crushed stone or a cover can be made to fit around the tree. Remember the cover will need to be reshaped from time to time as the tree grows.

PROPAGATION

Most trees sold for home gardens are hybrids. They have been developed by breeding and selection, and have not grown from seed. These trees, which include all cultivars of crab apple, honey-locust, littleleaf linden, and maple, are propagated by grafting. Although this is a fascinating way of propagating plants, it is beyond the scope of most amateurs. However, should you decide to try it, there are many good books on plant propagation that will provide details.

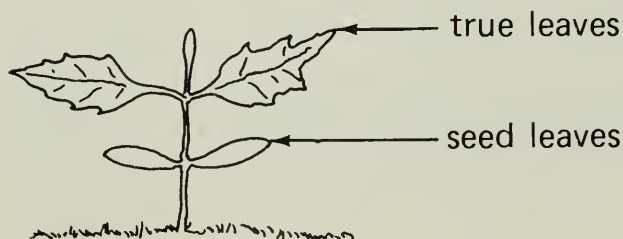
Tree species—plants that can be found growing naturally somewhere in the world—can often be grown from seed. Most seeds of trees need a period of cold before they can germinate. Other seeds need to be sown as soon as they are ripe, because they quickly lose their viability if they are stored. For the home gardener who wishes to grow a few seedling trees, the procedure is the same for all species and is described below.

In a lightly shaded part of the garden, dig a small bed (add sand on heavy soils), firming and raking it to a fine tilth. As soon as seeds are ripe, clean them, remove the wings on aerial seeds (maple and ash), or extract the seeds or pits from berried species. Sow the seed thinly and about twice its diameter deep. Label each row carefully and identify both ends. To prevent mice, squirrels, or cats from digging up the seeds, construct a chicken-wire cage with low walls and a removable top.

Those seeds that germinate fresh will sprout quickly; others will germinate the following spring. Do not be impatient. Some seeds have a double dormancy: they need one cold period before they produce their roots and another before the shoot will appear. They do not appear to germinate until the second spring after sowing. Keep the area weeded at all times so that when the seedlings emerge, they do not have to compete with weeds.

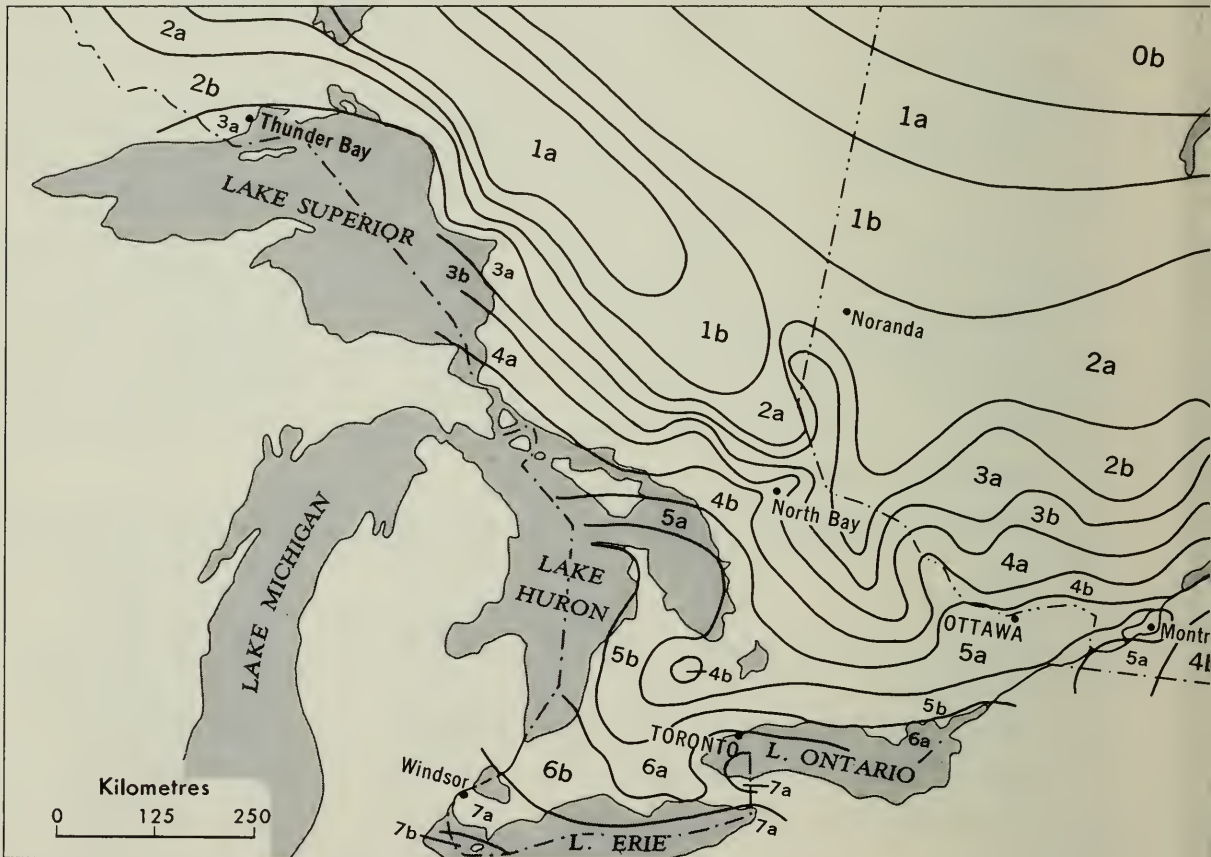
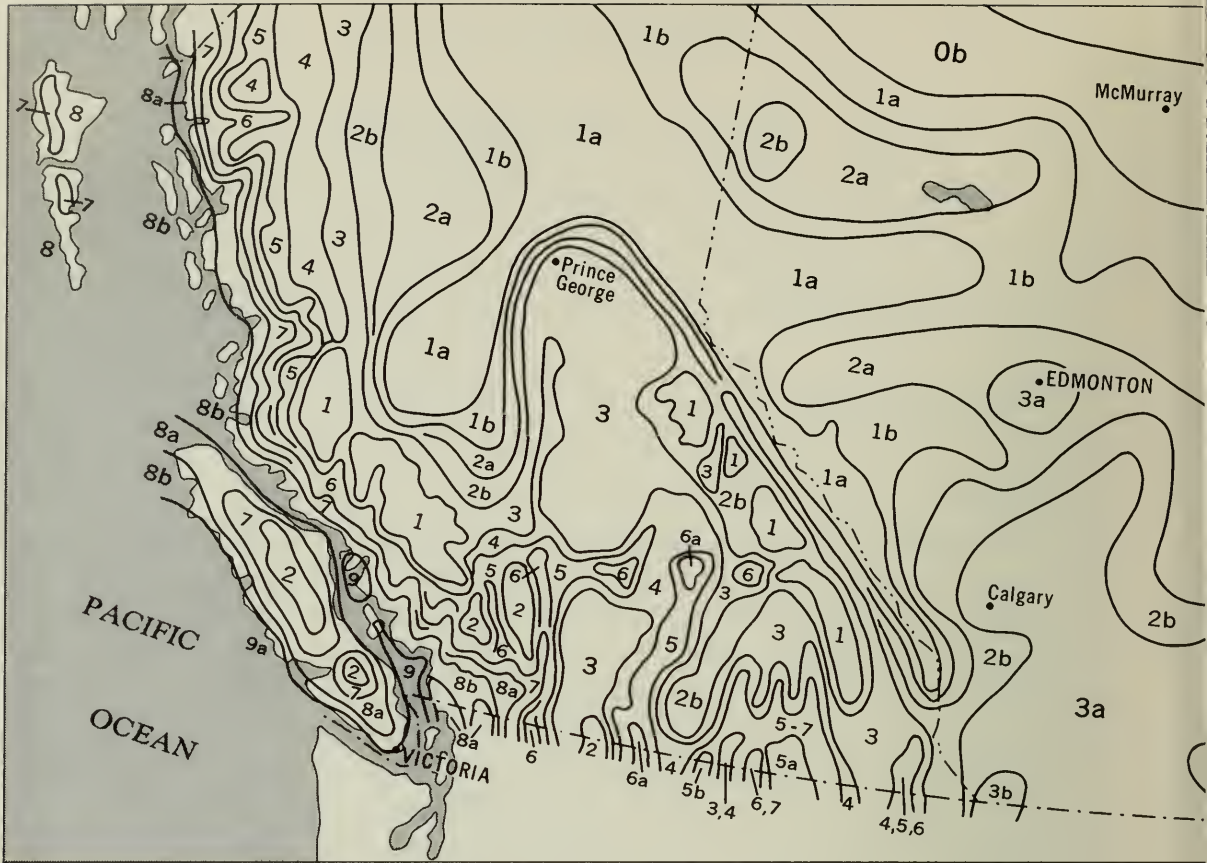
Carefully transplant the seedlings into a similar bed as soon as they have their first pair of true leaves (Fig. 24), spacing the transplants about 15 cm apart and watering them well. Transplant them again in early spring, when the seedlings are about 50 cm high. To develop good straight trunks, tie each seedling to a bamboo cane. Once the seedlings reach 1.5–2 m in height they can be transplanted again to their final location. The trees need support for the first few years, until the trunks are about 2 cm in diameter.

FIG. 24 Transplant seedlings when they have their first pair of true leaves.

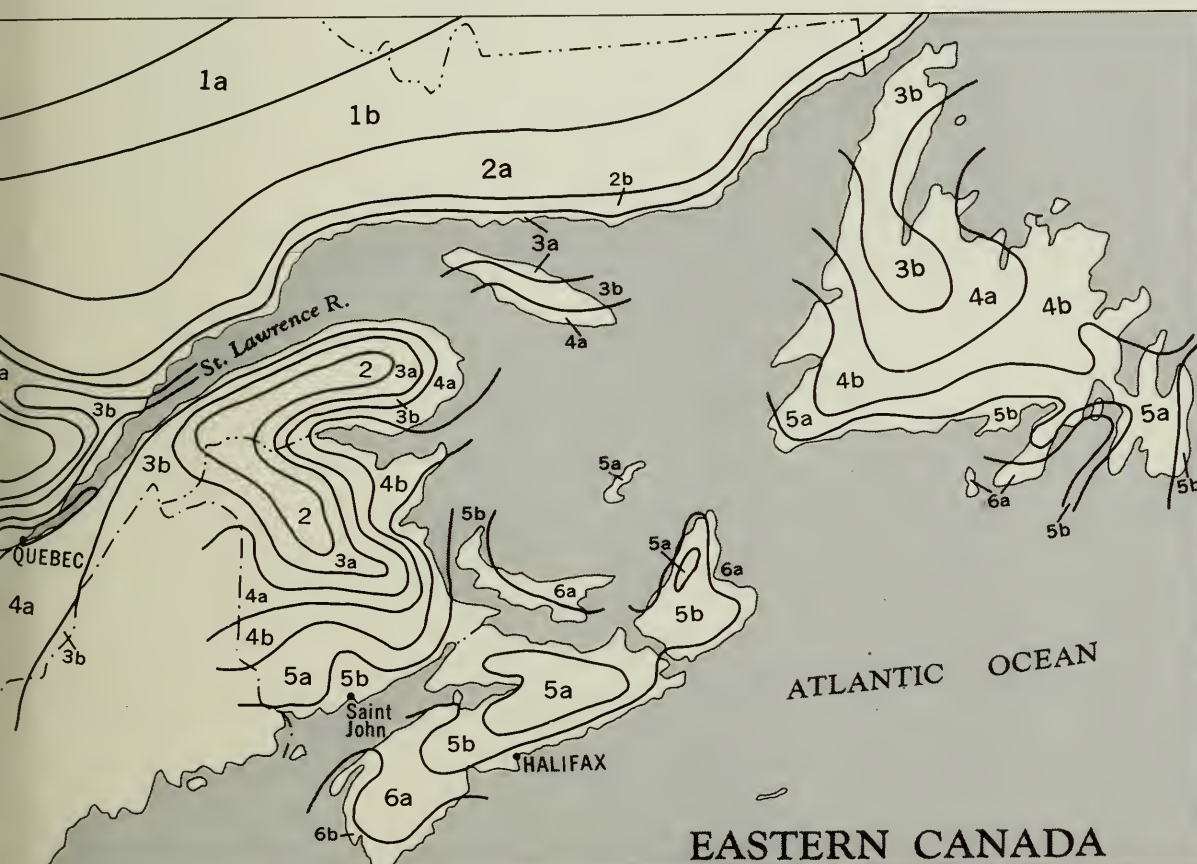
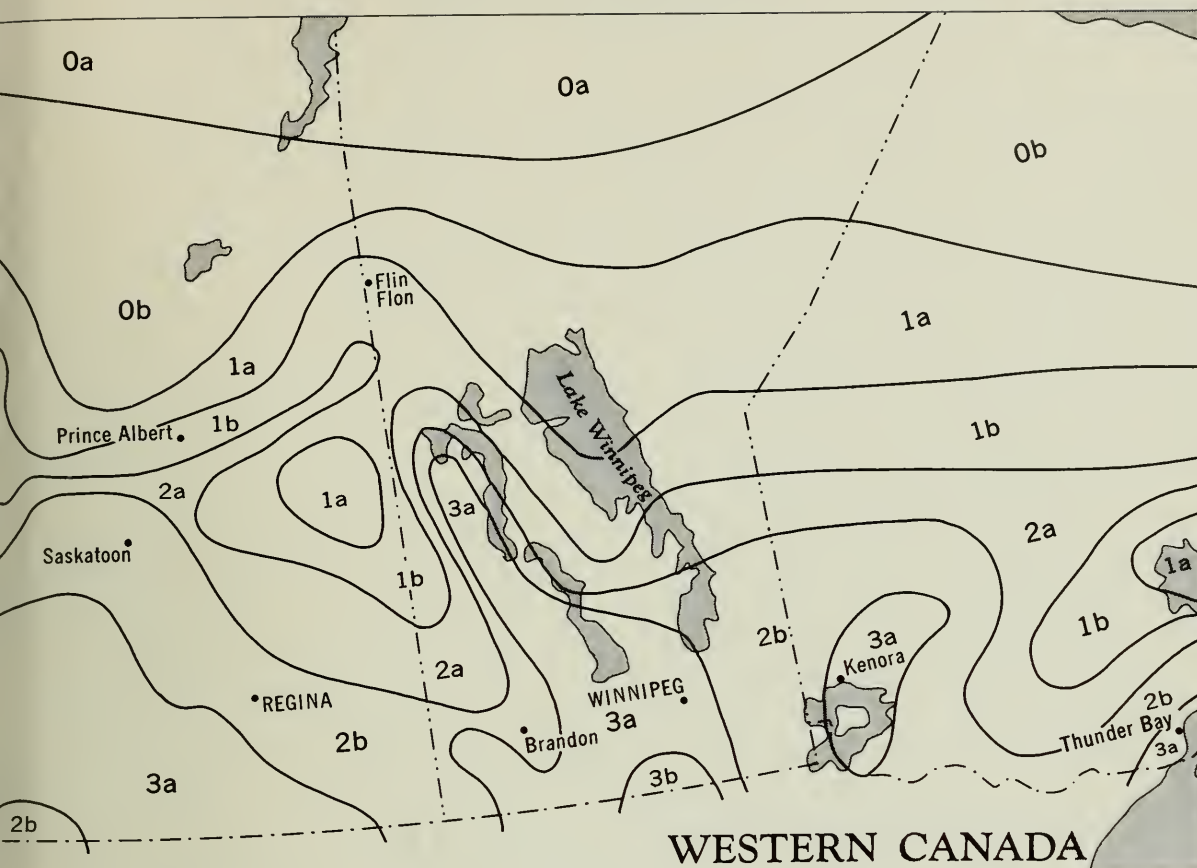


CONVERSION FACTORS

Metric units	Approximate conversion factors	Results in:
LINEAR		
millimetre (mm)	x 0.04	inch
centimetre (cm)	x 0.39	inch
metre (m)	x 3.28	feet
kilometre (km)	x 0.62	mile
AREA		
square centimetre (cm ²)	x 0.15	square inch
square metre (m ²)	x 1.2	square yard
square kilometre (km ²)	x 0.39	square mile
hectare (ha)	x 2.5	acres
VOLUME		
cubic centimetre (cm ³)	x 0.06	cubic inch
cubic metre (m ³)	x 35.31	cubic feet
	x 1.31	cubic yard
CAPACITY		
litre (L)	x 0.035	cubic feet
hectolitre (hL)	x 22	gallons
	x 2.5	bushels
WEIGHT		
gram (g)	x 0.04	oz avdp
kilogram (kg)	x 2.2	lb avdp
tonne (t)	x 1.1	short ton
AGRICULTURAL		
litres per hectare (L/ha)	x 0.089	gallons per acre
	x 0.357	quarts per acre
	x 0.71	pints per acre
millilitres per hectare (mL/ha)	x 0.014	fl. oz per acre
tonnes per hectare (t/ha)	x 0.45	tons per acre
kilograms per hectare (kg/ha)	x 0.89	lb per acre
grams per hectare (g/ha)	x 0.014	oz avdp per acre
plants per hectare (plants/ha)	x 0.405	plants per acre



Map of plant hardiness zones in Canada



Cartography by the Land Resource Research Institute, Research Branch, Agriculture Canada, 1980.

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